

**Session Law 2010-180 SECTION 13.(a):
Agency Planning and Regulatory Program
Information Related to Climate Change**

**Report to the
Environmental Review Commission
Nov. 1, 2011**

**From the Department of Environment and Natural Resources for:
The Department of Administration,
the Department of Agriculture and Consumer Services,
the Department of Commerce,
the Department of Crime Control and Public Safety,
the Department of Environment and Natural Resources,
the Department of Health and Human Services,
the Department of Insurance, and
the Department of Transportation**

Introduction

S.L. 2010-180 / House Bill 1766 required state agencies to determine whether the impacts of global climate change are being considered in state regulatory and planning programs. As recommended by the Legislative Commission on Global Climate Change, the goal of S.L. 2010-180 is to encourage state agencies to consider the potential impacts of climate change in developing state policy and planning for future infrastructure.

SL 2010-180 focuses on the challenge of adapting to climate change and sea-level rise in ways that reduce the state's vulnerability to these impacts. This law does not specifically address any effort to reduce energy consumption or greenhouse gas emissions. Under a separate reporting requirement, state agencies submit an annual Strategic Energy Plan to the State Energy Office to document reduction of energy and water consumption.

Each agency considered the projected impacts of global climate variability and change, as well as recent extreme events, in this evaluation. The Department of Environment and Natural Resources (DENR) must compile and report the information provided by the specified agencies to the Environmental Review Commission by Nov. 1, 2011.

DENR developed an instructional packet (Appendix 1) that outlines the projected impacts of global climate variability and change, as well as recent extreme events, that NC agencies should consider in the evaluation. The department gave briefings to leaders and other key staff members regarding the legislative requirement and provided an electronic survey form (Appendix 2) to gather the agency responses. This report includes responses for 77 planning and regulatory programs within the eight specified departments.

Some of these programs reported that they currently consider global climate change impacts in their programs, while many others indicated that this could be considered in the future. This information is helpful for the departments to evaluate when and how certain programs might be modified to enhance the safety and resiliency of our residents to climate-related hazards.

Session Law 2010-180 SECTION 13.(a) requirements

"SECTION 13.(a) The Department of Administration, the Department of Agriculture and Consumer Services, the Department of Commerce, the Department of Crime Control and Public Safety, the Department of Environment and Natural Resources, the Department of Health and Human Services, the Department of Insurance, and the Department of Transportation shall:

(1) Review their respective planning and regulatory programs to determine whether the programs currently consider the impacts of global climate change, including adaptation and sea level rise.

(2) For those programs that currently consider the impacts of global climate change, the agency shall describe how the program considers the impacts of global climate change, including adaptation and sea level rise, and recommend whether the consideration of the impacts of global climate change should be modified or expanded.

(3) For those programs that do not currently consider the impacts of global climate change, the agency shall recommend if and how the program should consider the impacts of global climate change, including adaptation and sea level rise.

SECTION 13.(b) No later than September 1, 2011, each State agency shall report the results of its review and any recommendations to the Department of Environment and Natural Resources. The department shall compile the results and recommendations and report them to the Environmental Review Commission and to any future legislative commission that directly and primarily addresses issues concerning global climate change no later than November 1, 2011.”

Terminology Provided for Clarification to Department Respondents

Adaptation: Management strategies for natural or human systems to cope with climate impacts. Proactive adaptation takes place before the impacts of climate change are observed, while reactive adaptation occurs afterwards.

Adaptive capacity: The ability of a natural or human system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

Consider: Think about carefully, take into account or weigh consequences of potential impacts.

Global climate change impact: Direct result of climate variability or change on natural and human systems; for example, sea-level rise, temperature increases, variability in precipitation, more severe storms, or increases in flooding, shoreline erosion, landslides and drought.

Planning program: A program whose purpose is to make or carry out plans, specifically including establishing goals, policies and procedures for the agency, other programs, the public or other government, social or economic units.

Regulatory program: A program whose purpose is to implement and administer particular legislation or rules.

Resiliency: A capability to anticipate, prepare for, respond to and recover from significant multi-hazard threats with minimum damage to social well-being, the economy and the environment.

Sea level rise: A long-term increase in the average surface height of the oceans.

Vulnerability: The degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes.

Responses Organized by Department and Program

Department of Administration

Government Operations

Planning Program name: Government Operations

N.C. Legislative Authority for Program: E.O. 123

Purpose of Program: Administration of State Building Construction, Property and Facilities

Currently considers these climate impacts: Rising sea level, higher storm surge, increased droughts

Considers adaptation strategies: 1) Advise re: structural elevations and boundaries when approving state construction in flood plain areas. 2) Dig wells during drought to avoid using municipal supplies. 3) Include language in leases with termination clause if weather event renders a site unusable.

Recommendation for modification or expansion: Yes, request more information from DENR.

Department of Agriculture and Consumer Services

In accordance with S.L. 2010-180, the North Carolina Department of Agriculture and Consumer Services (NCDA&CS) has conducted a review of existing planning and regulatory programs to determine whether the programs currently consider the impacts of global climate change, including adaptation and sea level rise. As a result of this review, it does not appear that the General Assembly has directed or authorized the department to consider climate change in any of its programs, nor has the department been able to identify any programs where the outcomes or services provided would be different if based on assumptions about long-term changes in climate. For example, soil testing and other agronomic services are based on assumptions about climate in the near-term. While long-term climate changes could have significant impacts on agriculture, adaptation to these changes will occur gradually, along with changes in our programs. While some programs, such as transportation, may require consideration of expected climate conditions in the distant future, that does not appear to be the case with most of our programs. One exception to this might be the participation of the Emergency Programs Division in the Sea Level Rise Management Study noted below. Nevertheless, the NCDA&CS has identified several programs that provide assistance to private landowners and the general public that may be helpful in addressing increased risk of adverse impacts that may be associated with global climate change.

Recommendations

Although there continues to be significant uncertainty regarding North Carolina's future climatic conditions¹, agriculture and agribusiness must be capable of adapting to a variety of broadly changing conditions, including potential changes in climate. Even in the absence of global warming, there is strong reason for proactive planning in the face of North Carolina's known vulnerabilities to hurricanes, winter storms, flooding and drought. Maintaining and enhancing the ability of private landowners to provide an adequate, wholesome supply of food, natural fiber and wood products given potential changes in climate, technology and market conditions must be a continuing priority for the North Carolina Department of Agriculture and Consumer Services.

¹ "Climate Change in North Carolina." State Climate Office of North Carolina. August 18, 2011.

Emergency Programs Division

Planning Program name: Emergency Programs

N.C. Legislative Authority for Program: Appropriations Act

Purpose of Program: The mission of the Emergency Programs Division is to reduce the vulnerability to or the impact from, any disaster, disease or terrorist attack on North Carolina's agricultural community. The Emergency Programs Division provides leadership within the NCDA&CS and the agricultural community for emergency preparedness and response. The division establishes public-private partnerships between vital government agencies, industry and volunteers and works cooperatively with the Division of Emergency Management in the N.C. Department of Crime Control and Public Safety.

Currently considers these climate impacts: In addition to a variety of man-made or terrorist threats, the Emergency Programs Division is responsible for responding to the following events or circumstances that may arise: hurricanes and weather events, fires/forest fires, catastrophic animal or plant diseases or pests.

Considers adaptation strategies: The Emergency Programs Division is also cooperating with the N.C. Division of Emergency Management to assist in the development of the North Carolina Sea Level Rise Management Study. A variety of agricultural systems, including crops, silviculture, irrigation, livestock and aquaculture facilities are potentially vulnerable to adverse impacts associated with sea level rise. The overarching goal of this study is to inform state and federal policy makers on the subject of potential sea-level rise impacts and foster development of risk management policy.

Plant Industry Division

Regulatory Program name: NCDA&CS Weed Regulatory Program

N.C. Legislative Authority for Program: The N.C. Plant Pest Law, the Aquatic Weed Control Act

Purpose of Program: The NCDA&CS Weed Regulatory Program was established to protect N.C. agriculture and its citizens from the invasion and spread of noxious weeds. The N.C. Plant Pest Law authorizes the department to aggressively prevent the entry and subsequent spread of noxious weeds into the state and to address the movement of noxious weeds and regulated articles within the state. In addition, the Aquatic Weed Control Act provides the department with the authority to regulate the importation, sale, use and distribution of noxious aquatic weeds.

Currently considers these climate impacts: Invasion and spread of noxious weeds

Considers adaptation strategies: As implemented, the law and associated regulations provide the long-term mechanisms for protecting North Carolina agriculture and its citizens from the threat of terrestrial and aquatic noxious weeds. The department also works in cooperation with the USDA Animal and Plant Health Inspection Service to detect exotic plant pests and weeds through the Cooperative Agricultural Pest Survey. NCDA&CS currently administers four insect quarantines. These include two federal quarantines for the gypsy moth and the red imported fire ant, and two state quarantines for the boll weevil and the sweet potato weevil. Responsibility for these quarantines is shared among additional state and federal agencies; however, the NCDA&CS is the lead agency.

Division of Soil and Water Conservation

Planning Program name: Division of Soil and Water Conservation

N.C. Legislative Authority for Program: General Statute 139; GS 106-840

Purpose of Program: The mission of the Division of Soil and Water Conservation is to foster voluntary, incentive-driven management of soil, water and related natural resources for the benefit of the environment, economy and all citizens. The division is recognized as having one of the nation's top soil and water conservation programs for private lands. This effort is achieved through a conservation partnership comprised of the state division, local conservation districts and the U.S. Department of

Agriculture Natural Resource Conservation Service, as well as private and nonprofit entities. The partnership is successful in putting conservation measures on the ground across the North Carolina landscape, largely due to the strong local district infrastructure.

Currently considers these climate impacts: Drought

Considers adaptation strategies: In February 2011, NCDA&CS announced the publication of a “Strategic Plan for Protecting Agricultural Water Resources for North Carolina.” As a result of the development of this strategic plan, legislation was adopted by the North Carolina General Assembly establishing the Agriculture Water Resources Assistance Program (AgWRAP) in the Division of Soil and Water Conservation. The purpose of this program is to: 1) Provide technical and financial support to farmers and agricultural landowners who want to implement best management practices that conserve water, 2) Increase the efficiency of private water use, and 3) Increase the water storage capacity of agricultural lands. AgWRAP received an initial appropriation of \$1 million in 2011. The department is working with the N.C. Soil and Water Conservation Commission to implement this program to enhance the ability of North Carolina agriculture to be more resilient in the face of drought and ever-increasing demands on our state’s water resources.

North Carolina Forest Service

Planning Program name: North Carolina Forest Service

N.C. Legislative Authority for Program: GS 106-840; Chapters 77, 113 and 143 of the North Carolina General Statutes and by Title 15, Chapter 9 of the North Carolina Administrative Code

Purpose of Program: The mission of the North Carolina Forest Service is to develop, protect and manage the multiple resources of North Carolina’s forests through professional stewardship, enhancing the quality of life for our citizens while ensuring the continuity of these vital resources.

Currently considers these climate impacts: Wildfires, forest insects and disease

Considers adaptation strategies: The NCFS is responsible for implementing the state’s forest fire protection program that includes fire prevention efforts, pre-suppression activities and aggressive fire suppression efforts on all wildfires under the jurisdiction of the state. The Forest Service provides a wide range of technical and financial assistance to private landowners including forest establishment assistance, intermediate stand management practices and assistance with proper harvesting methods. Assistance also includes managing for non-timber benefits, as well as water quality protection and improvement during forestry operations. The NCFS also works with forest landowners for the detection and control of destructive forest insects and disease. NCFS staff, in cooperation with other agencies and universities, constantly monitors movement of these pests through trappings and surveys to prevent, monitor and control insects and diseases that threaten forest health.

Agronomic Services Division

Planning Program name: Agronomic Services

N.C. Legislative Authority for Program: GS 106-22

Purpose of Program: The Agronomic Services Division provides all North Carolina residents with diagnostic and advisory services that increase agricultural productivity, promote responsible land management and safeguard environmental quality. The division helps growers and landowners make informed decisions about fertilization, liming, pest control, irrigation, waste management and related matters.

Currently considers these climate impacts: Economic and environmental stress that is often predicted in global warming scenarios.

Considers adaptation strategies: Reliable agronomic information increases production and efficiency while safeguarding the environment. It forms the foundation for policies that protect the immediate

interests of consumers and producers while conserving the land resources upon which future generations will depend. Science-based, agricultural production and land management information will be even more critical in the future if North Carolina experiences the economic and environmental stress that is often predicted in global warming scenarios.

Research Stations Division

Planning Program name: Research Stations

N.C. Legislative Authority for Program: GS 106-22.1

Purpose of Program: The mission of the Research Stations Division is to manage crop and livestock facilities that serve as a platform for agricultural research to make farming more efficient, productive and profitable, while maintaining a sound environment and providing consumers with safe and affordable products. The department, in cooperation with the College of Agriculture and Life Sciences at North Carolina State University, has established research farms at 18 statewide locations. Each facility has unique climate and soil conditions, giving researchers a living laboratory in which to investigate a variety of opportunities related to crops, forestry concerns, livestock, poultry and aquaculture. The division supports these studies by providing land, water, equipment, buildings, and staff.

Currently considers these climate impacts: Potential changes in climate

Considers adaptation strategies by: The result of these efforts is to maintain and enhance agriculture's ability to provide an adequate, wholesome supply of food and natural fiber given potential changes in climate, technology and market conditions.

Department of Commerce

Community Development, Community Planning Division

Planning Program name: Community Planning

Purpose of Program: Provide planning and technical support to rural local governments

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Climate change could be reviewed and addressed as part of local comprehensive planning consulting work. As part of the community planning program's community outreach, the division can help provide education regarding the affects of climate change on local land use.

Department of Crime Control and Public Safety

North Carolina Emergency Management, Recovery Section, Hazard Mitigation Branch

Planning Program name: Hazard Mitigation

Regulatory Program name: Stafford Act/Hazard Mitigation

N.C. Legislative Authority for Program: NCGA 166A

Federal Authority for Program: Stafford Act, 44 CFR section 201

Purpose of Program: Reduce the future impacts of natural hazards on people and property.

Currently considers these climate impacts: Rising sea level, higher storm surge, increased flooding, tropical cyclone rainfall, increased droughts, worse heat waves, changes in weather patterns; agricultural losses; increase in pandemic and foreign animal disease; increased energy demands; economic impacts

NOTE: State Hazard Mitigation Plan (322 Plan) identifies long-term hazards as changes in weather patterns and sea level due to climate change. No specific predictions or assessments are included.

Narrative suggests that sea level rise might be as much as 3-4 feet by the end of the 21st century. This plan addresses the impact of sea level rise and climate change as having the potential to increase risk of flooding and other natural hazards that the state is already threatened by.

Considers adaptation strategies: Continuation of current strategies designed to mitigate the impacts of flooding, wildfire, drought, heat waves and severe winter weather. These strategies are not sea level rise or climate change-specific. They address existing hazards that may be exacerbated by climate change.

Recommendation for modification or expansion: Risk of and impacts of flooding are well-recognized and well-understood in North Carolina. Rising sea level will have impacts on coastal and riverine flooding well inland. Existing flood mitigation programs might be expanded to include areas currently outside of the mapped 1 percent annual chance flood hazard area.

Department of Environment and Natural Resources

Division of Air Quality, Planning and Permits Sections

Planning Program name: Emissions Inventory, Air Quality Education and Outreach

Regulatory Program name: Air Quality Permitting

N.C. Legislative Authority for Program: G.S. 143-215.107, 143-215.3; 143-215.107; 143-215.108; 143-215.109

Federal Authority for Program: 42 U.S.C. 7401 Clean Air Act

Purpose of Program: The Planning Section performs modeling and analyses to determine how federal and state air quality standards are attained. The Planning Section works with the legislature and the Environmental Management Commission to develop rules and programs for meeting air quality standards. In addition, it maintains the emissions inventory for the state (an inventory of air pollution sources) and has programs to educate the public about air pollution. The Permits Section handles the issuance, renewal and modification of air quality permits, as required by both federal and state rules and regulations.

Currently considers climate impacts: Increasing greenhouse gas emissions and temperatures

NOTE: The final reports of the N.C. Climate Action Plan Advisory Group and the N.C. Legislative Commission on Global Climate Change provided specific recommendations to reduce greenhouse gas emissions and develop action plans. DAQ's activities related to climate change focus on three non-regulatory greenhouse gas reduction strategies identified in the reports: state-wide greenhouse gas inventories and forecasts, GHG reporting/registry and public education and outreach. The DAQ has emphasized voluntary actions that can both help the state meet National Ambient Air Quality Standards for criteria pollutants and provide a co-benefit of reducing greenhouse gas emissions. One approach involves educating and informing citizens about voluntary actions to reduce energy usage through conservation/energy efficiency measures and use of alternate fuels and transportation methods. Another activity involves development of a multi-pollutant emissions inventory for North Carolina using data submitted to the DAQ and the Environmental Protection Agency (EPA). The DAQ also provides technical assistance to industry and university partners to increase energy efficiency, reduce fuel/electricity costs and reduce air emissions.

The only DAQ regulatory activity related to greenhouse gases involves implementation of EPA rules that require new emission sources to address greenhouse gas emissions in the permitting process. DAQ's permitting requirements do not go beyond federal requirements.

Considers adaptation strategies: No

Recommendation for modification or expansion: A key unanswered question at the local level is how climate change affects ground level ozone and particulate matter, and the impact of those pollutants on

ambient air quality. Some states have analyzed those effects, but accurate data on regional climate scenarios are needed for North Carolina to conduct air quality modeling and assess potential increases in ozone action days.

Division of Air Quality, Technical Services Section

Regulatory Program name: Technical Services

N.C. Legislative Authority for Program: G.S. 143-215.3; 143-215.65; 143-215.66; 143-215.107; 143B-282; S.L. 1989, c.168, s. 45

Federal Authority for Program: 42 U.S.C 7401 Clean Air Act

Purpose of Program: Technical Services is responsible for tracking facilities for compliance with air quality rules, regulating emissions from mobile sources and implementing the state rules for controlling toxic air emissions.

Currently considers climate impacts: No

Considers adaptation strategies: No

Recommendation if program does not currently consider climate impacts: Should not consider it. Technical Services responds to federal and state regulations regarding air quality. Therefore, at this time the focus is on reporting and mitigation efforts.

Division of Air Quality, Permits Section

Regulatory Program name: Permits

N.C. Legislative Authority for Program: G.S. 143-215.3; 143-215.107; 143-215.108; 143-251.109

Federal Authority for Program: 42 U.S.C. 7401 Clean Air Act

Purpose of Program: Permits handles the issuance, renewal and modification of air quality permits in North Carolina required by both federal and state regulations.

Currently considers these climate impacts: No

Considers adaptation strategies: No

Recommendation if program does not currently consider climate impacts: The permits program responds to federal and state air quality regulations. Permits currently focuses on GHG reporting requirements and any future mitigation requirements.

Division of Air Quality, Ambient Monitoring Section

Regulatory Program name: Ambient Monitoring

N.C. Legislative Authority for Program: G.S. 143-215.3; 143-215.107

Federal Authority for Program: 42 U.S.C. 7401 Clean Air Act

Purpose of Program: Ambient Monitoring is responsible for measuring levels of regulated pollutants in the ambient air through a network of 45 monitoring stations across the state.

Currently considers climate impacts: No

Considers adaptation strategies: No

Recommendation if program does not currently consider climate impacts: Should not consider it. Ambient monitoring is a program driven by the requirements of federal and state air quality standards.

Division of Coastal Management, Policy and Planning Section

Planning Program name: Coastal and Estuarine Land Conservation Program (CELCP)

Federal Authority for Program: Coastal Zone Management Act 16 U.S.C. 1456d

Purpose of Program: Protecting important coastal and estuarine areas that have significant conservation, recreation, ecological, historical, or aesthetic values, or that are threatened by conversion

from their natural or recreational state to other uses, giving priority to lands which can be effectively managed and protected and that have significant ecological value.

Currently considers climate impacts: No, but an update to the NC CELCP plan is in progress, and will take sea level rise into account in evaluating potential acquisitions. Program is dedicated to conservation of coastal land with high ecological value. Often this land is waterfront and/or and may be highly vulnerable to sea level rise impacts.

Considers adaptation strategies: No

Recommendation if program does not currently consider climate impacts: Should consider it. Incorporate consideration of sea level rise in project selection. The CRC's Science Panel on Coastal Hazards reported a potential range of 0.4-1.4 meters by 2100, and recommended planning for 1 meter. The state's updated CELCP plan will provide that guidance to grant applicants and allow them the flexibility to discuss the amount of sea level rise anticipated and how the conservation target will be affected. Applicants could also propose acquisition of lands to serve an adaptation purpose; one example would be acquisition for purposes of allowing a specific type of coastal habitat (such as salt marsh) to migrate landward in response to sea level rise.

Division of Coastal Management, NC Coastal Reserves/National Estuarine Research Reserve System

Planning Program name: North Carolina Coastal Reserves

N.C. Legislative Authority for Program: § 113A-129.1-3

Federal Authority for Program: : Coastal Zone Management Act 16 U.S.C. 1461 National Estuarine Research Reserve System (Section 315)

Purpose of Program: Acquiring, improving and maintaining undeveloped coastal land and water areas in a natural state.

Currently considers climate impacts: Rising sea level, higher storm surge

NOTE: The N.C. Reserve is a network of 10 sites protected for research and education purposes. These undeveloped conservation lands provide an opportunity to monitor for sea level rise on unaltered shorelines. The N.C. Reserve includes the N.C. National Estuarine Research Reserve (NCNERR), which is part of the National Estuarine Research Reserve System (NERRS). EPA has developed a climate change initiative for implementation at NERR sites across the country. The goal of this initiative is to understand, mitigate and adapt to climate change impacts on estuaries and coastal communities. The concept of using Reserve sites as "sentinel" sites for sea level rise is intended to increase understanding of climate change. The geographic distribution of the 10 reserve sites in North Carolina provides the opportunity to monitor the variable rates of sea level rise expected in the different regions of the N.C. coast and the resultant impacts on habitats. These living laboratories provide a unique opportunity to monitor and assess the impacts of sea level rise on representative coastal ecosystems and inform resource management decisions at both reserve sites and in N.C.'s coastal communities. The N.C. Reserve is currently working on aspects of the sentinel sites initiative at the Rachel Carson site (Carteret County) and at the Masonboro (New Hanover) and Zeke's Islands sites (New Hanover and Brunswick counties). Components of the sentinel sites initiative include: a local network of benchmarks, tide stations, water quality stations (monitoring sites for a number of different water quality measures as well as water level), sediment elevation table, habitat transects in habitats most vulnerable to changes in sea level (e.g., marsh and submerged aquatic vegetation), digital elevation models and groundwater/porewater wells. The N.C. Reserve's education and training programs will be used to help local communities and resource managers plan for sea level rise using information gathered through the sentinel sites program.

Considers adaptation strategies: Adaptation is part of the NERRS climate change initiative. The NERRS sites are expected to engage in adaptation planning for the individual reserve sites, nearby protected

areas, and/or the local community through partnerships. Adaptation strategies will be tailored to the unique risks in the local areas. The NERRS adaptation strategy aims to increase understanding of climate change and improve adaptation planning. It is anticipated that implementation of this component of the climate change initiative will begin in several years.

Recommendation for modification or expansion: Not at this time. We are in the early stages of implementing the sentinel sites initiative and expect to begin implementation of the climate change initiative within the next several years. We would like to fully test these initiatives before modifying or expanding them. The Reserve works with the National Estuarine Research System and its committees to implement the NERRS climate change and sentinel sites initiatives. It will be helpful for DENR to convene a workgroup comprised of agencies that own/manage lands that are threatened by climate change to facilitate understanding and adapting to climate change within the state.

Division of Coastal Management, Policy and Planning Section

Planning Program name: Coastal Resources Commission Policies

N.C. Legislative Authority for Program: § 113A-100 through 134.3

Federal Authority for Program: Coastal Zone Management Act 16 U.S.C. 1455 Administrative Grants (Section 306)

Purpose of Program: To establish generally applicable objectives and policies to be followed in the public and private use of land and water areas within the coastal area of North Carolina.

Currently considers climate impacts: Not directly, but the Coastal Resources Commission is in the process of developing a sea level rise policy. The CRC's Science Panel on Coastal Hazards reported a potential range of 0.4-1.4 meters by 2100, and recommended planning for 1 meter. The CRC is considering a policy that gives local governments information on sea level rise, but leaves it up to the local governments to decide how to use the information for planning.

Considers adaptation strategies: The CRC is not planning to require local governments to take any specific adaptation actions in the immediate future. The CRC's current focus is on sea level rise education as a precursor to future strategies.

Recommendation if program does not currently consider climate impacts: Continue development of SLR policy and enter into the NC Administrative Code when appropriate. DCM has planning and policy staff that is supporting the CRC and Coastal Resources Advisory Council in developing the policy.

Division of Coastal Management, Policy and Planning Section

Planning Program name: Section 309 Coastal Zone Enhancements

Federal Authority for Program: Coastal Zone Management Act 16 U.S.C. § 1456b Coastal Zone Enhancement Grants (Section 309)

Purpose of Program: To develop program changes in one or more of nine specified enhancement areas: public access, coastal hazards, ocean resources, wetlands, cumulative and secondary impacts, marine debris, special area management planning, energy and government facility siting and aquaculture.

Currently considers these climate impacts: Rising sea level; this program is not oriented towards a specific level of sea-level rise, but does take into consideration the CRC Science Panel's planning level of 1 meter by 2100.

Considers adaptation strategies: No, at this stage, the program is focused on policy development and land use planning guidelines.

Recommendation for modification or expansion: The current program sets out a 5-year strategy for program enhancements (2011-2015). The focus at this stage is sea level rise education, policy development and revising the CRC's land use planning guidelines. The next 5-year strategy will expand consideration of sea level rise impacts through incentives and technical assistance. DCM has positions

that are federally funded by the 309 program, although the future of those positions is uncertain. DCM also has other non-309 policy staff that contribute to the 309 program.

Division of Coastal Management, Permitting and Enforcement Section

Regulatory Program name: Coastal Area Management Act (CAMA) Coastal Development Permitting

N.C. Legislative Authority for Program: § 113A-100 through 134.3

Federal Authority for Program: Coastal Zone Management Act 16 U.S.C. 1455 Administrative Grants (Section 306)

Purpose of Program: To protect areas of environmental concern (AECs) from uncontrolled development, which may cause irreversible damage to property, public health or the environment.

Currently considers these climate impacts: Rising sea level:

7H.0208: Estuarine development standards require that development be designed and sited to avoid significant adverse impacts upon the productivity and biologic integrity of the natural system; however, does not address how to achieve this as sea level rises. Rule allows permanent erosion control structures but encourages use of sloped structures or vegetation rather than vertical bulkheads. Rule was recently amended to create development standards for wind energy facilities.

7H.0209: The management objective for estuarine and public trust shorelines is to ensure that shoreline development is compatible with the dynamic nature of coastal shorelines as well as the values and the management objectives of the estuarine and ocean system.

7H.0303: The management objective for ocean hazard areas is to limit the loss of life and property through careful location and design of structures, and to prevent damage to protective dunes and beaches.

7H.0304: The CRC designates ocean hazard areas that are based on measured and projected likelihood of adverse impact.

7H.0306: The CRC's use standards for ocean hazard areas require setbacks for oceanfront development. The setbacks are based upon long-term average annual erosion rates, which inherently account for relative sea-level rise over the period (generally about 50 yrs). Allows beach fill as a temporary response to erosion, which also serves to mitigate some sea level rise impacts. Prohibits development from weakening primary and frontal dunes, which serve as defense from storm surge. Requires permit applicants to acknowledge the risks associated with building in ocean hazard areas. Permits include condition that structures be relocated or removed within two years if they become imminently threatened, unless other steps are taken (beach restoration or sandbagging).

7H.0308: Allows sandbags for oceanfront erosion control. Allows permanent (hardened) structures to protect certain structures and under limited conditions. This allowance will be available to structures/sites that qualify as they become increasingly threatened by sea level rise. Allows for creation of new protective dunes and stabilization/strengthening of existing dunes. Requires new development to minimize exposure to damage from 100-year storm and variations in ground elevation.

7H.0310: Use standards for inlet hazard areas recognize additional hazards in these areas by imposing additional restrictions on development.

Considers adaptation strategies: Shoreline defense

Recommendation for modification or expansion: The rules listed previously can be examined for modification. In addition, the following rules can potentially be modified/expanded:

7J.0203: Sets forth the required elements that must be included in work plats in major permit applications.

7L.0512: Directs additional financial support (if available) to communities that wish to exceed the minimum CAMA planning requirements and be designated as Sustainable Communities. This section can be expanded to incorporate SLR planning and adaptation measures.

Division of Coastal Management, Policy and Planning Section

Planning Program name: CAMA Land Use Planning

N.C. Legislative Authority for Program: § 113A-100 through 134.3

Federal Authority for Program: Coastal Zone Management Act 16 U.S.C. 1455 Administrative Grants (Section 306)

Purpose of Program: Establishes the rules that local governments shall follow in developing and adopting Coastal Area Management Act (CAMA) Land Use Plans.

Currently considers these climate impacts: Program directs local governments to consider the potential impacts of coastal hazards, including sea level rise, but does not give any guidance about how to do so. Local governments may include as much or as little at their discretion. Coastal land use decisions are highly sensitive to climate change impacts, particularly sea-level rise.

Recommendation for modification or expansion: The CRC has begun efforts to educate local governments and the public about sea level rise. DCM has planning and policy staff that can support the CRC and CRAC in developing guidance for local governments. A joint CRC-CRAC committee has been working with DCM staff on potential guidance.

Recommendation if program does not currently consider climate impacts: Could consider it. The program should provide local governments better guidance on how to assess the potential impacts of sea-level rise and take steps to make their communities less vulnerable.

Office of Conservation, Planning and Community Affairs, Natural Heritage Program

Planning Program name: Natural Heritage Program (NHP)

N.C. Legislative Authority for Program: Nature Preserves Act 113A-164; Admin. code 15A NCAC 12H

Purpose of Program: The program inventories, catalogues and assists with conservation of the rarest and the most outstanding elements of the natural diversity of our state. NHP data is used by agencies and the public to guide and prioritize conservation efforts and by corporations and local governments to simplify compliance with state and federal environmental regulations.

Currently considers these climate impacts: Rising sea level, higher storm surge, increased flooding, tropical cyclone rainfall, increased droughts, worse heat waves, coastal erosion, wind damage from increased storms, increased wildfires, increased overall temperature (considered different than heat waves), mild winters; ecosystems, habitats and species that occur along the coastline and near the coastline have been assessed for their vulnerability to sea level rise as part of the NHP climate change assessment. With this assessment, ecosystem responses to rising sea level and changing climate have been identified and potential "adaptation strategies" that can be taken to reduce or mitigate the impacts are described.

Considers adaptation strategies: In the NHP assessment, adaptation strategies to various climate change impacts in all 42 broad ecosystem groups across the state are described.

Recommendation for modification or expansion: The NHP climate change assessment right now is a first iteration; more input from partners is needed.

Office of Conservation, Planning and Community Affairs, Albemarle-Pamlico National Estuary Program

Planning Program name: Albemarle-Pamlico National Estuary Program

Authority by: Governor's Executive Order 122 (2007)

Federal Authority for Program: Clean Water Act §320

Purpose of Program: Implementation of National Estuary Program

Currently considers these climate impacts: Rising sea level, storm surge, flooding, droughts, wetland loss

Considers adaptation strategies: Sea level rise varies with location. Sea level rise is considered in funding, research projects and restoration activities.

Recommendation for modification or expansion: None. APNEP is currently addressing relative impacts to the program and ecosystem in its update of planning and monitoring activities.

Ecosystem Enhancement Program

Planning Program name: EEP Watershed Planning

N.C. Legislative Authority for Program: SL 143-214.8-214.13, SL 2009-337, SL 143-214.20, SL 143-214.21, SL 2007.438, SL 2007-484, 15A NCAC 02R.0100-02R.0500, 15A NCAC 02B.0240, 15A NCAC 02B.0274

Federal Authority for Program: Clean Water Act: 33 U.S.C. 1251 et seq. (1972), 33 CFR Parts 325 & 332, Environmental Protection Agency 40 Part 230

Purpose of Program: The purpose of the Ecosystem Enhancement Program is to provide a comprehensive, natural resource enhancement program that identifies ecosystem needs at the local watershed level and preserves, enhances and restores ecological functions within target watersheds while addressing impacts from anticipated N.C. Department of Transportation projects and permitted impacts from other development projects.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it.

1) Incorporate data developed by other agencies, such as the N.C. Natural Heritage Program Vulnerability Assessment, into EEP watershed plans. 2) Evaluate the impact of sea level rise on ecosystems and determine if current target communities proposed for restoration are appropriate or if transitional communities should be developed. 3) Coordinate with regulatory agencies to account for climate change planning and the associated relevance to mitigation projects. 4) Evaluate climate trends and the effects on mitigation success criteria.

Division of Land Resources, Land Quality Section

Regulatory Program name: Mining Program

N.C. Legislative Authority for Program: NCGS Chapter 74 Article 7 The Mining Act of 1971 and the rules to implement that law NCAC Title 15A Chapter 5 -- Mining

Federal Authority for Program: Office of Surface Mining -- U.S. Department of Interior

Purpose of Program: The Mining Program was established to regulate land-disturbing activities for the extraction of mineral resources where such extraction would minimize its effects on the surrounding environment. Furthermore, proper reclamation of mined land is necessary to prevent undesirable land and water conditions that would be detrimental to the general welfare, health, safety, beauty and property rights of the citizens of the state. Land-disturbing activities for the purpose of extracting minerals requires submission and approval of a mining permit. Because mining is an ongoing activity and a temporary land-disturbing activity such as would be regulated under the Erosion and Sedimentation Control Program, the erosion and sedimentation control features at a mine must be designed to withstand a significantly larger rainfall event. This amount of precipitation is provided by NOAA. The Mining Program also inspects operating mines to ensure compliance with the Mining Act. Once mining is completed, the site must be reclaimed in accordance with the approved reclamation plan. A performance bond, based on the size of the disturbed area, is required to ensure the site is reclaimed to compatible use.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it. The requirements for erosion and sedimentation control are based on the precipitation data provided by

NOAA. If updated NOAA data indicates either increased or decreased precipitation due to climate change, the program must use the most recently available data.

Division of Land Resources, Land Quality Section

Regulatory Program name: Dam Safety Program

N.C. Legislative Authority for Program: Dam Safety Law of 1967 and the rules found in Title 15A SubChapter 2K -- Dam Safety

Federal Authority for Program: FEMA Dam Safety Program provides some funding to support a state dam safety program.

Purpose of Program: The Dam Safety Program exists to (1) review and approve all designs for jurisdictional dams or the repair or modification of existing dams; (2) ensure that the jurisdictional dams are built, repaired or modified in compliance with the specifications approved in the original plans or repair/modification plans and any approved modifications to those original plans; and (3) to inspect jurisdictional dams on a regular basis to ensure that the dams are being properly maintained and that there are no conditions at the dam that might result in the failure of that dam; and (4) provide technical assistance to dam owners, local governments and state agencies, such as the State Emergency Response Team (SERT), should a dam begin to fail or conditions are anticipated that could cause a dam or dams to fail. The rainfall depth-duration relationships for hydraulic dam design are derived from the National Oceanic and Atmospheric Agency (NOAA) in NOAA Atlas 14, which can be used in digital format at the website "http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html". PMP (Probable Maximum Precipitation) based depth-duration relationships can be calculated using Hydrometeorological Report (HMR) No. 51 and 52, augmented by HMR No. 56 in western regions of the state.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it. The Dam Safety Program uses NOAA data to determine the spillway design flood. NOAA Atlas 14 was published in 2004. Previous precipitation data was published in TP-40 (1961) and Hydro-35 (1977). If NOAA updates precipitation data, both state law and regulation would require the Dam Safety Program to use the most recent available data.

Division of Land Resources, Land Quality Section

Regulatory Program name: Erosion and Sediment Control

N.C. Legislative Authority for Program: 113A-50 to 69 -- Sedimentation Pollution Control Act of 1973 with rules in Title 15A Chapter 4: Sediment Control

Federal Authority for Program: Clean Water Act

Purpose of Program: The purpose of the Sediment and Erosion Control Program is to prevent degradation of water quality from land-disturbing activities. The program uses data for North Carolina from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, published in 2004. It is only available online at "http://hdsc.nws.noaa.gov/hdsc/pdfs/orb/nc_pfds.html". Previous precipitation data was published in TP-40 (1960) and Hydro-35 (1977).

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it. By law and regulation, the data used to determine the level of storm which requires action comes from the NOAA data. If NOAA revises precipitation data for North Carolina, the Erosion and Sedimentation Control Program would have to use the revised data, as it has in the past after the release of revised data.

Division of Marine Fisheries, Habitat Protection Section

Planning Program name: Coastal Habitat Protection Program

N.C. Legislative Authority for Program: GS 113-131; GS 143B-279.8

Purpose of Program: Develop a coastal habitat protection plan that will result in long-term enhancement of coastal fisheries associated with coastal habitats. The plan includes recommendations for the environmental regulatory commissions (Marine Fisheries Commission, Coastal Resources Commission, Environmental Management Commission), which must be implemented. The effects of climate change on each type of coastal habitat are discussed in the plan and several recommendations directly address it.

Currently considers these climate impacts: Rising sea level, higher storm surge, increased flooding, tropical cyclone rainfall, increased droughts, worse heat waves, increased water temperatures, changing salinities and currents

NOTE: The 2010 CHPP includes scientific information on expected impacts to fish habitat and water quality from rising sea level. Several plan recommendations directly and indirectly address rising sea level. Recommendation # 1.3 and #1.8 directly address it. Recommendations 3.1 and 3.4 indirectly address it.

Considers adaptation strategies: Recommendation # 3.8: Develop coordinated policies including management adaptations and guidelines to increase resiliency of fish habitat to climate change and sea level rise.

Recommendation # 1.3: Enhance and expand educational outreach on fish habitat value, threats, climate change and reasons for management measures.

Recommendation for modification or expansion: Could consider it. Implementation actions are needed.

Division of Marine Fisheries, Resource Enhancement Section

Planning Program name: Oyster Sanctuary Program

N.C. Legislative Authority for Program: GS 113-131, GS 143B-279.8

Purpose of Program: Create subtidal oyster sanctuaries on previously viable oyster-producing sites to increase oyster reefs, habitat for associated fish species and seed source of oysters to accelerate natural recruitment of oysters in other areas. Will enhance the oyster fishery and provide structure for fish, which in turn enhances fishing of larger species.

Currently considers these climate impacts: Increased flooding, tropical cyclone rainfall, increased droughts, oxygen, salinity and turbidity

Considers adaptation strategies: Several of the sanctuaries are located in low salinity waters, and will be able to survive in higher salinities should Pamlico Sound become more open and saline with rising sea level. Also placing new reefs throughout the sound will enhance the ability of oyster larvae to disperse and settle in other areas, as conditions change.

Recommendation for modification or expansion: Currently adequate

Division of Marine Fisheries, Fisheries Management Section

Planning Program name: Fisheries sampling programs - multiple

N.C. Legislative Authority for Program: GS 113-131; GS 143B-279.8

Purpose of Program: Conduct fisheries sampling to determine condition of the stocks, which guides fishery management plan development, recommendations and rule changes. Long-term environmental data collected with fish sampling could allow monitoring of climate change.

Currently considers these climate impacts: Increased flooding, tropical cyclone rainfall, increased droughts.

Considers adaptation strategies: By having multiple sampling stations along the entire coast, biologists can determine distribution of fish in relation to environmental conditions.

Recommendation for modification or expansion: No, very thorough.

Marine Fisheries, Shellfish Sanitation & Recreational Water Quality

Regulatory Program name: N.C. Recreational Water Quality Program

N.C. Legislative Authority for Program: G.S. 130A-233.1

Federal Authority for Program: Public Law 106-284

Purpose of Program: Monitor coastal recreational waters and notify the public when swimming standards are exceeded.

Currently considers these climate impacts: Increased flooding, tropical cyclone rainfall

Considers adaptation strategies: No

Recommendation for modification or expansion: Could consider it. Municipalities/utilities need to have an increased role in communicating health risk to the public when sewage overflows into waters of the state. Educate local governments.

Marine Fisheries, Shellfish Sanitation and Recreational Water Quality

Regulatory Program name: Shellfish Sanitation Program

N.C. Legislative Authority for Program: GS 130A-230

Purpose of Program: Classifying coastal waters as to their suitability for shellfish harvesting, monitoring and issuing advisories for coastal recreational swimming areas, and certification of shellfish and crustacean processing plants.

Currently considers these climate impacts: Increased flooding, tropical cyclone rainfall

Considers adaptation strategies: No

Recommendation for modification or expansion: No

Marine Fisheries, Shellfish Sanitation & Recreational Water Quality

Regulatory Program name: Shellfish Processing Plant Inspection Program

N.C. Legislative Authority for Program: G.S. 130A-230; 15A NCAC 18A .0100 - .0900

Federal Authority for Program: National Shellfish Sanitation Program Guide for Molluscan Control of Shellfish (NSSP Model Ordinance)

Purpose of Program: Certification and inspection of shellfish and crustacea processing plants and facilities.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: We inspect seafood processing facilities and are not involved with management or habitat issues. If sea level rises we may have permitted dealers whose facilities flood. On the other hand, there might be more suitable habitat to grow shellfish.

Division of Parks and Recreation, Planning and Natural Resources Section

Planning Program name: Planning and Natural Resources

Purpose of Program: Protect the state's outstanding natural resources, provide outdoor recreation and natural resource interpretation and education.

Currently considers these climate impacts: Increased droughts

Considers adaptation strategies: The division has been working with the N.C. Natural Heritage Program to identify vulnerable systems and provide buffers for refuge for plants and animals affected by climate change. By constructing LEED-certified buildings, the division works to minimize cooling costs, plant

native drought tolerant species and reduce greenhouse gas associated with heating and cooling. The division works to site all facilities significantly outside of flood zones. In addition, the division works to minimize facilities and provide natural environments. Land protection works to protect a number of ecosystems that may be affected by rising sea-level.

Recommendation for modification or expansion: Could be modified. Some of our guidelines for green construction have been documented: however, other acquisition and natural resource guidelines have not been well documented. The division should develop a group or committee to review policies and procedures in light of climate change.

Division of Waste Management, Brownfields Program

Regulatory Program name: Brownfields Program

N.C. Legislative Authority for Program: NCGS 130A310.30 et seq

Purpose of Program: To break down the barriers to redeveloping brownfields sites, making them viable and beneficial to the community while being protective of public health and the environment.

Currently considers these climate impacts: Rising sea level, higher storm surge, increased flooding, tropical cyclone rainfall, increased droughts

Considers adaptation strategies: In general the program incorporates these issues on a normal basis. This includes floodplain issues and how to best redevelop in these areas along with sea level rise areas, etc. The program evaluates each location in a site- specific manner including proximity to possible sea-level rise or floodways and floodplains. This is incorporated into the brownfields agreement by way of restrictions on land use, occupancy of structures or building design. The program did not develop these practices due to global climate change, but rather because of the program's emphasis on sustainability and implementation of best practices.

Recommendation for modification or expansion: Could consider it. The program already emphasizes sustainability and best practices, not so much for impacts but for prevention and diminishing causation. Will continue to evaluate and institute practices across the program.

Division of Waste Management, Solid Waste Program

Planning Program name: Solid Waste Management

Regulatory Program name: Solid Waste Management

N.C. Legislative Authority for Program: GS 130A-294 (Planning) GS 130A-309 (Regulatory)

Purpose of Program: Regulatory oversight of solid waste disposal and management facilities, planning for solid waste management on local, regional and statewide basis.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it.

1) Impacts of sea level change on existing solid waste facilities. 2) Climate changes including localized extreme weather events, especially rainfall, will need to be tracked and updated as the precipitation rates affect landfill design. 3) Extreme weather may increase the needs for emergency planning for debris disposal or even mass mortality of livestock in the event of drought/freeze/heat.

Division of Waste Management, Underground Storage Tanks Section

Regulatory Program name: Underground Storage Tanks

N.C. Legislative Authority for Program: GS 143-215.94(a) et al

Federal Authority for Program: 40 CFR

Purpose of Program: The UST Section issues permits, collects annual fees and handles requests for information for regulated and /or commercial underground storage tanks. The section ensures compliance with all relevant state and federal laws, policies, rules and regulations by assisting owners

and operators in complying with operational standards (leak detection, spill and overfill detection, etc.). This section oversees the administration of several trust funds for the reimbursement of cleanup costs associated with UST releases, and oversight of the remediation. This section also oversees the permanent closure activities of UST systems.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it.

Division of Waste Management, Superfund Section

Regulatory Program name: Superfund

N.C. Legislative Authority for Program: 130A-310

Federal Authority for Program: CERCLA/SARA

Purpose of Program: Clean up contamination resulting from past actions.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it in context of setting criteria for site prioritization.

Division of Waste Management, Hazardous Waste Section

Planning Program name: Hazardous Waste

Regulatory Program name: Hazardous Waste

N.C. Legislative Authority for Program: 130A

Federal Authority for Program: RCRA Subtitle C

Purpose of Program: Regulate the management of hazardous waste.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it. Review GIS overlays of generators and permitted facilities to evaluate potential impacts of sea level rise.

Division of Water Quality, Environmental Sciences Section

Planning Program name: Surface Water Monitoring

N.C. Legislative Authority for Program: GS 143-214 and 215

Federal Authority for Program: Clean Water Act

Purpose of Program: To monitor surface waters effectively and efficiently

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Should not consider it.

The program relies upon standards and recommendations set by other programs. Those other programs already could consider climate change impacts, therefore the monitoring program implicitly considers climate change impacts over time.

Division of Water Quality, Construction Grants and Loans Section

Regulatory Program name: Grants and Loans and Tax Certifications - for public sewer treatment facilities

N.C. Legislative Authority for Program: GS 143-215.1, 15A NCAC 2T

Purpose of Program: Administers funding programs for publicly owned sewer collection, wastewater treatment, clean water green infrastructure projects and issues authorizations to construct, sewer permits and administers tax certifications process.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider prioritization of funding for clean water green infrastructure projects if climate change impacts were specifically

considered as part of the project. Climate change impacts would first need to be more clearly defined. Also, tax certification could be considered for certain or specific climate change adaptations, which would probably require law changes.

Division of Water Quality, Surface Water Section

Regulatory Program name: Sewer Collection Systems

N.C. Legislative Authority for Program: GS 143-215, 130A-335

Purpose of Program: Permitting for sewer collection systems

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Not known. In order to consider changes, major funds/law changes would likely be necessary.

Division of Water Quality, Surface Water Section

Regulatory Program name: Wetlands, Buffers and Stormwater Branch

N.C. Legislative Authority for Program: GS 143-214 and 143-215

Federal Authority for Program: Clean Water Act

Purpose of Program: Implements wetland, riparian buffer and stormwater regulatory programs.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it. Particularly, areas of concern are shoreline hardening and coastal sea level rise. Need definitive guidance and permission from DENR to move forward with considerations. The Branch has one organizational unit, Program Development Unit, which implicitly would consider climate change impacts as they become known. Stormwater program could incorporate changed best management practices into BMP manuals as practices are updated to deal with climate issues. Updates are already done regularly, therefore any additional updates could roll into the existing process.

Division of Water Quality, Point Source Branch

Regulatory Program name: National Pollutant Discharge Elimination System (NPDES) Wastewater Permitting

N.C. Legislative Authority for Program: GS 143-215

Federal Authority for Program: Clean Water Act

Purpose of Program: Permitting and compliance for wastewater that discharges directly to surface waters.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it. Permit cycles are every five years, therefore when information is provided, it can be considered at these intervals. Therefore, future conditions are implicitly able to be considered.

Division of Water Quality, Aquifer Protection Section

Regulatory Program name: Animal Waste Management Systems

N.C. Legislative Authority for Program: GS 143-215.10A-10I; 15A NCAC 2T

Purpose of Program: Permitting and compliance for wastes from animal feeding operations (AFOs)

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it. Changes in precipitation patterns, growing seasons and seasonal high water tables could all affect the loading rates and waste application periods for animal wastes. Hydrologic changes could impact existing systems, or eliminate currently usable land for waste application. Climate change could also result in a

shift in crop rotations impacting animal waste management. The animal operations program uses data from the National Weather Service, specifically Technical Paper #40, called “Rainfall Frequency Atlas of the US.” Updated technical information could be incorporated into the program. New information could be considered upon permit renewals.

Division of Water Quality, Aquifer Protection Section

Regulatory Program name: Well Construction Program

N.C. Legislative Authority for Program: GS 87, Article 7; 15A NCAC 2C .0200

Purpose of Program: Permitting and compliance for construction of water supply wells, monitoring wells and other wells.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it; unknown in what way at present.

Division of Water Quality, Aquifer Protection Section

Planning Program name: Groundwater Monitoring and Planning

N.C. Legislative Authority for Program: GS 143-215.8A

Federal Authority for Program: Clean Water Act, Sections 106 and 319

Purpose of Program: Monitor water quality and develop recommendations for regulatory program improvement or response to new situations.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it. Data from existing monitoring programs could be used to identify impacts of climate change on water quality. Additional data, new investigations or new strategies may be necessary to identify impacts of climate change and help regulatory programs adapt.

Division of Water Quality, Aquifer Protection Section

Regulatory Program name: Non-Discharge (wastewaters and residuals not discharged to surface waters)

N.C. Legislative Authority for Program: GS 143-215.1; 15A NCAC 2T

Purpose of Program: Permitting and compliance for wastewaters and residuals that are land-applied, recycled or reused.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it. Changes in precipitation patterns, growing seasons and seasonal high water tables could all affect the loading rates and waste application periods for wastewaters and residuals. Hydrologic changes could impact existing systems, or eliminate currently usable land for residuals applications. Climate change could also result in a shift in crop rotations impacting residual and animal waste management.

Division of Water Quality, Aquifer Protection Section

Regulatory Program name: Underground Injection Control

N.C. Legislative Authority for Program: GS 87, Article 7; GS 143-215.1; 15A NCAC 2C .0200

Federal Authority for Program: Safe Drinking Water Act

Purpose of Program: Permitting and compliance for construction and use of injection wells

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it. Climate change could affect demand for different types of injection activities as well as the demand for use of injection wells to manage water supplies. Uses of injection wells are very uncommon in North Carolina;

increasing demand could require more time for permitting, rule development or site-specific geology to be researched. Cumulative effect of these systems on water quality, and thus water quantity available for drinking water, could be a hazard.

Division of Water Quality, Planning Section

Planning Program name: Basinwide Water Quality Plans

Regulatory Program name: Basinwide Planning

N.C. Legislative Authority for Program: GS 143-215.8B, 143B-282

Federal Authority for Program: Clean Water Act Section 205(j)

Purpose of Program: River basin and smaller watershed based approach to restoring and protecting water quality.

Currently considers these climate impacts: Rising sea level – the program just acknowledges the science. Basinwide planning is a five-year cyclic planning process that currently includes information about climate change. Because it is a program that restarts every five years, new information can always be included.

Considers adaptation strategies: No

Recommendation for modification or expansion: No

Division of Water Quality, Planning Section

Planning Program name: Nonpoint Source

N.C. Legislative Authority for Program: GS 143-214 and 143-215

Federal Authority for Program: Clean Water Act, Section 319

Purpose of Program: To develop programs to deal with nonpoint source pollution (runoff from any source).

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it. Part of the program is dedicated to support grants to develop and improve the science behind non-point pollution controls. Future grant requests for proposals could prioritize proposals that consider climate change issues.

Division of Water Quality, Planning Section

Planning Program name: Modeling and Total Maximum Daily Load

Regulatory Program name: Total Maximum Daily Load (TMDL)

Federal Authority for Program: Clean Water Act, Section 303(d)

Purpose of Program: To identify waters not meeting water quality standards; prioritize waters for management strategies or TMDL development.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it at some time; however, with the number of unknowns it is probably not prudent to include more uncertainty in modeling and TMDLs at this time. Seasonal variability is already included in modeling therefore, as models evolve with better information, it is implicit that changes in climate would be included in future modeling and TMDLs.

Division of Water Quality, Planning Section

Planning Program name: State Environmental Policy Act (SEPA)

Regulatory Program name: State Environmental Policy Act (SEPA)

N.C. Legislative Authority for Program: GA 113A, Article 1

Purpose of Program: The North Carolina (or State) Environmental Policy Act of 1971 (SEPA) requires state agencies to review and report the environmental effects of all activities that involve an action by a state agency, an expenditure of public monies or private use of public land, and that may have a potential negative environmental effect upon natural resources, public health and safety, natural beauty, or historical or cultural elements of the state. The Act was adopted by the General Assembly into law in 1971 (G.S. 113A, Article 1) in order to: 1) Encourage the wise, productive, and beneficial use of the natural environment; 2) Preserve the natural beauty of the state; 3) Create a public awareness of our environment; and 4) Require state agencies to consider and report on environmental aspects and consequences of their actions involving the expenditure of public money or use of public land.

Currently considers climate impacts: No

Considers adaptation strategies: Projects or activities subject to SEPA require all three of the following conditions to be met: 1) An action by a state agency (issuing permits); 2) An expenditure of public money or private use of public land; and 3) A potential detrimental environmental effect upon natural resources, public health and safety, natural beauty or historical or cultural elements of the state's common heritage.

Recommendation if program does not currently consider climate impacts: Could consider it. SEPA rules/regulations would need to change to require public funded projects to consider climate change impacts. Climate change impacts first need to be defined with established scales.

Division of Water Resources, Water Resources Management Section

Planning Program name: Water Supply Planning Branch

Regulatory Program name: Water Shortage Response Plans

N.C. Legislative Authority for Program: 15A NCAC 02E.0607

Purpose of Program: Rules governing water use during droughts and water emergencies

Currently considers climate impacts: No

Considers adaptation strategies: The Section is working with RTI to include climate change hydrologic modeling scenarios.

Recommendation if program does not currently consider climate impacts: Could consider it by doing at linking the basin planning and modeling work with other division programs.

Division of Water Resources, Water Resources Management Section

Planning Program name: Ground Water Management Branch

Regulatory Program name: Central Coastal Plain Capacity Use Area

N.C. Legislative Authority for Program: G.S. 143-215.11 & 15A-2E.0100

Purpose of Program: To regulate the ground water withdrawals from 15 Coastal Plain counties.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it. The Central Coastal Plain Capacity Use Area permitting program came about to fix a very clear case of a large number of ground water users over-pumping a set of confined aquifers (Cretaceous Aquifers). The results of the permitting program will be to force permit holders to switch a portion of their withdrawals to other more sustainable and more easily recharged sources of water. These expensive investments in other water sources will serve the public well in the years to come and will allow continued use of the Cretaceous aquifers at a sustainable rate. Climate change did not figure into nor prompt the development of the program, however, we may consider adding climate change impacts as we improve our understanding of the ultimate capabilities of these aquifers through our river basin planning and modeling work.

Division of Water Resources, Water Resources Management Section

Planning Program name: River Basin Management Branch

Regulatory Program name: Interbasin Transfer

N.C. Legislative Authority for Program: G.S. 143-215.22l

Purpose of Program: Regulation of larger Interbasin transfer of surface water.

Currently considers climate impacts: No

Considers adaptation strategies: The Section is working with RTI to include climate change hydrologic modeling scenarios.

Recommendation if program does not currently consider climate impacts: Could consider it by linking the basin planning and modeling work with other division programs.

Division of Water Resources, Water Resources Management Section

Planning Program name: Water Supply Planning Branch

Regulatory Program name: Local Water Supply Planning

N.C. Legislative Authority for Program: G.S. 143-355(l)

Purpose of Program: For local governments to assess their water system's current and future water needs and their ability to meet those needs.

Currently considers climate impacts: No

Considers adaptation strategies: The Section is working with RTI to include climate change hydrologic modeling scenarios.

Recommendation if program does not currently consider climate impacts: Could consider it by linking the basin planning and modeling work with other division programs.

Division of Water Resources, Water Resources Management Section

Planning Program name: River Basin Management Branch

Regulatory Program name: Water Resources River Basin Planning & Hydrologic Modeling

N.C. Legislative Authority for Program: G.S. 143-355(o)

Purpose of Program: River basin water resources planning based on sound science using hydrologic river basin models.

Currently considers these climate impacts: Rising sea level, increased droughts

Considers adaptation strategies: GIS-based to check which public water system wells and intakes will be impacted. The Branch is working with RTI to include climate change hydrologic modeling scenarios. Will be testing if the current drought management plans are adequate.

Recommendation for modification or expansion: Currently only doing a pilot study in the Tar River basin, needs to be expanded statewide.

Division of Water Resources, Public Water Supply Section

Regulatory Program name: N.C. Water Treatment Facility Operators Certification Board

N.C. Legislative Authority for Program: GS 90A-20-34; NCAC 15A 18D

Purpose of Program: Certification of personnel operating water treatment facilities in North Carolina.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: No

Division of Water Resources, Public Water Supply Section

Regulatory Program name: Protection and Enforcement Branch

N.C. Legislative Authority for Program: 130A-312 through 328, Rules Governing Public Water Systems

Federal Authority for Program: Safe Drinking Water Act and 40 CFR Part 141

Purpose of Program: Evaluate and compel compliance with operational and construction requirements for public water systems.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: No

Division of Water Resources, Public Water Supply Section

Planning Program name: Public Water Supply Supervision Program

Regulatory Program name: Public Water Supply Supervision Program

N.C. Legislative Authority for Program: GS 130A Article 10

Federal Authority for Program: Safe Drinking Water Act

Purpose of Program: Safe drinking water protection

Currently considers these climate impacts: Increased flooding, tropical cyclone rainfall, increased droughts

Considers adaptation strategies by: No

Recommendation for modification or expansion: Could consider it, but the program has not yet identified specific ways to do so. Wells are sited in non-flood prone areas and variability in supply of water is taken into consideration when planning for water supplies. Well-siting takes increased flooding into account. Source development considers variability. There will need to be increased data on the changes in the hydrologic cycle to know how much change is needed.

NOTE: The program has been doing this kind of work already, independent of climate change. Water supply planning already involves preparation for droughts and floods. Updated flow statistics for surface and ground water availability would be needed to allow water systems or the state to adjust the yield calculations that are now done from published flow statistics. (Good flow statistics require a sufficient number of monitoring stations; currently there are not enough stations to address a large-scale and complex issue like climate change) Water conservation is being legislated and promoted more and more, which helps with the availability of water supply.

Department of Health and Human Services

Division of Public Health, Occupational & Environmental Epidemiology Branch

Planning Program name: North Carolina's Program to Plan for the Public Health Impacts of Climate Change

Purpose of Program: Public Health

Currently considers these climate impacts: Health impacts from rising sea level, higher storm surge, increased flooding, tropical cyclone rainfall, increased droughts, worse heat waves, storm events, overall increases in heat

Considers adaptation strategies: Current health impact adaptations and priority health impacts; Under development

Recommendation for modification or expansion: No, efforts are already under way.

Environmental Health Services, Children's Environmental Health Branch

Planning Program name: Childhood Lead Poisoning Prevention Program

Regulatory Program name: Childhood Lead Exposure Control

N.C. Legislative Authority for Program: G.S. 130A-131.5 through 131.9H; 15A NCAC 18A .3101 through .3111

Federal Authority for Program: The CDC, EPA & HUD each publish guidelines covering various program activities; DENR receives funding from the CDC & HUD; the EPA has rules governing inspector certification and various aspects of environmental investigation.

Purpose of Program: To reduce childhood lead exposure

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: No

Environmental Health Services, Pools, Tattoos and Institutions

Regulatory Program name: Pools, Tattoos and Institutions

N.C. Legislative Authority for Program: G.S. 130A-5, 130A-235, 130A-280-283....

Purpose of Program: The Pools, Tattoos and State Institutions Branch protects public health by: assuring safe and sanitary design, construction and operation of public swimming pools; enforcing sanitation and infection control procedures practiced by tattoo artists and permanent color technologists; advising state agencies on health management at state institutions; evaluating sanitation of health care facilities and confinement facilities licensed or certified by the Department of Health and Human Services; and evaluating sanitation of public, private and religious schools. Standards are enforced statewide by environmental health specialists employed by county health departments.

Currently considers these climate impacts: Increased flooding, tropical cyclone rainfall, increased droughts, food supply problems from increased spoilage to disease range changes. Sea level rise can affect well water quality and float coastal swimming pools.

Recommendation for modification or expansion: Could consider it. This will be a slow adaptation rather than an abrupt change of strategies. Temperature controls needed to reduce food spoilage will be more challenging.

Environmental Health Services, Radiation Protection

Regulatory Program name: Radioactive Materials Branch

N.C. Legislative Authority for Program: G.S. 104 E Radiation Protection Act, 15A NCAC 11

Federal Authority for Program: Agreement State status requires USNRC compatibility

Purpose of Program: To protect the public and environment from radiation hazards

Currently considers these climate impacts: Rising sea level, higher storm surge, increased flooding, worsening heat waves

Considers adaptation strategies: Programs has licensees located in low-lying areas subject to flooding and storm surge. This may adversely affect their ability to secure and protect radioactive material from loss or damage resulting in unnecessary exposure to radiation to the public or the environment. We also consider the affect staff use of gasoline-powered vehicles have on air and water quality and encourage 'grouping' fieldwork to minimize this impact while still performing state business.

Recommendation for modification or expansion: No. As effects of global climate change become more evident we will begin this kind of consideration.

Environmental Health Services, Food Protection Branch

Regulatory Program name: Food Protection

N.C. Legislative Authority for Program: 130A-247 through 250

Purpose of Program: Reduce foodborne illness and other communicable diseases

Currently considers these climate impacts: Rising sea level, increased flooding, increased droughts; rising sea level affects coastal establishments and also affects shellfish sanitation.

Considers adaptation strategies: There is a state Food Emergency Response Plan that addresses emergencies that exceed any agencies capacity.

Strategies are developed: Well developed

Recommendation for modification or expansion: Yes, we must continually reevaluate global climate change to ensure the plan adequately addresses any impact.

Division of Aging and Adult Services, Service Operations Section

Planning Program name: Operation Fan Heat Relief

Purpose of Program: Funds from private utility providers and others made available to this division passed on to area agencies on aging to purchase fans and limited numbers of air conditioners to assist older adults and adults with disabilities withstand high temperatures inside their homes and reduce heat-related illnesses.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: No. Since 1986, utility companies have been making contributions based on utility usage in counties within their service area. DAAS could open a dialogue with these companies to educate them and make them aware of the increased vulnerabilities of older adults and adults with disabilities as global climate increases affect N.C. in greater ways and how their contributions might be utilized in other ways.

Department of Insurance

Property & Casualty, Regulation of Rates

Regulatory Program name: Regulation of Rates (Article 40 & 41)

N.C. Legislative Authority for Program: Statute 58

Purpose of Program: Provide oversight and approval of forms and rates for use in North Carolina for personal and commercial lines of business.

Currently considers these climate impacts: Higher storm surge, Increased tropical cyclone severity

Considers adaptation strategies: HB 1305 introduced into the "Beach Plan" a consideration for mitigation credits that could be applied to an insurance policy based on the inclusion or retrofit of certain above standard building codes that make the home more fortified. The IBHS runs the training and certification for contractors to become eligible to build or retrofit structures to qualify for the credits that are submitted on behalf of all insurance companies by the North Carolina Rate Bureau.

Recommendation for modification or expansion: No. The program focuses on approval of rates and forms and not climate change directly. The larger goal of the program is to protect property owners and make their properties more resilient to severe storms.

Property & Casualty, Beach/Fair Plan

Regulatory Program name: Beach/Fair Plan

N.C. Legislative Authority for Program: HB1305

Purpose of Program: Insurance regulation

Currently considers these climate impacts: Higher storm surge, Increase in tropical cyclone intensity

Considers adaptation strategies: Mitigation credits are offered on insurance premiums for homes that are fortified with stronger building materials and design.

Recommendation for modification or expansion: No

Office of State Fire Marshal, State Insurance & Building Inspections, Risk Management

Regulatory Program name: State Code Enforcement

N.C. Legislative Authority for Program: GS 143-139

Purpose of Program: Provide building inspections for state buildings and risk management and insurance coverage for the same.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Yes, could consider it. In as much as it can, it is somewhat limited by local municipalities and their local zoning ordinances. The division does try to mitigate losses as much as possible and considers moving facilities when feasible.

Building Codes & Review, Engineering and Codes

Regulatory Program name: State Code Enforcement

N.C. Legislative Authority for Program: GS 143-139

Purpose of Program: Enforce existing building codes and provide interpretation of code issues

Currently considers these climate impacts: Codes include updated flood and wind speed maps made every three years which may reflect higher storm surge and increased droughts; it does not consider future sea level rise. They only enforce the code that is in place.

Considers adaptation strategies: There is some jurisdiction to impact water conservation/enforcement as well as local fires when droughts are in progress. The N.C. Energy Conservation Code addresses multiple items that have the goal of using less energy. We teach and subsequently test inspectors on aspects of the energy code. Rising water as another example; part of our job is to address construction around changing flood maps.

Recommendation for modification or expansion: No, the staff in this area are focused on enforcing existing codes and rules and do not create them. Where there could be some impact would be recommendations that they may present to the Building Code Council (who are appointed by the Governor). If we are asked to recommend items for global climate change, there is a "Green Code" that could be adopted for constructing state buildings. The green code takes materials, methods of construction and transportation into the scope of the project.

Department of Transportation

Intergovernmental Affairs and Budget Coordination, Transportation Planning Branch

Planning Program name: Long-Range Planning

N.C. Legislative Authority for Program: GS 136-66.2

Federal Authority for Program: 23 CFR 450.214 (Development and content of the long-range statewide transportation plan); 23 CFR 450 Subpart C (Metropolitan Transportation Planning & Programming); 40 CFR 93 (Determining Conformity of Federal Actions to State or Federal Implementation Plans); and Congestion Mitigation & Air Quality Program under SAFETEA-LU

Purpose of Program: Develop long-range transportation plans to serve existing and anticipated travel demand; conduct a continuing, cooperative and comprehensive ("3C") transportation planning process in urban areas over 50,000 in population; ensure that transportation plans conform to the State Implementation Plan (air quality conformity); fund transportation projects or programs that will contribute to attainment or maintenance of the national ambient air quality standards.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it.

An interagency team comprised of metropolitan planning organizations, rural planning organizations, Federal Highway Administration, environmental and permitting agencies, and NCDOT is currently having discussions on if and how climate considerations could be included in the long-range Comprehensive Transportation Planning process. One option would be to develop guidance that transportation

planners could use if they wanted to address climate considerations in their long-range planning processes; incorporation of climate considerations would be voluntary and not mandated. The guidance could include where discussions and analysis could be included in the development of Comprehensive Transportation Plans, and where decisions would best be made and documented. Development of the framework would be informed by national research in the transportation planning industry, best practices across the nation, and lessons learned from local and regional planning entities in North Carolina who are already considering climate change in the development of their overall planning efforts.

Division of Highways – Pre-Construction - Project Development and Environmental Analysis Branch

Planning Program name: Project Development (NEPA/SEPA)

N.C. Legislative Authority for Program: There are over 50 federal and state laws, and executive orders, that govern our work. The National Environmental Policy Act (NEPA) of 1969 and its state companion, the State Environmental Policy Act (SEPA) of 1971, are the overarching 'umbrella' federal and state authorities, respectively.

See <http://www.ncdot.org/doh/preconstruct/pe/MERGER01/PrintGDLaws.html> .

Federal Authority for Program: There are over 50 federal and state laws, and executive orders, that govern our work. The National Environmental Policy Act (NEPA) of 1969 and its state companion, the State Environmental Policy Act (SEPA) of 1971 are the overarching 'umbrella' federal and state authorities, respectively.

See <http://www.ncdot.org/doh/preconstruct/pe/MERGER01/PrintGDLaws.html> .

Purpose of Program: To guide the development, evaluation, decision-making and documentation of project need and alternatives for transportation projects through the incorporation of environmental considerations through a systematic interdisciplinary approach.

Currently considers climate impacts: No

Considers adaptation strategies: Currently, NCDOT does not consider global climate change on the basis of any future projections of impacts. Past or current effects of climate change are considered to the extent that existing databases reflect those changes (such as rain intensity data, flood elevations, etc., that are used for roadway, structure and hydraulic design). So, in that sense, NCDOT is considering climate change impacts that already show up in the data. We do not consider models or future projections of global climate change impacts.

Recommendation if program does not currently consider climate impacts: Could consider it. The following is a summary of the types of activities that could be implemented provided senior leadership at NCDOT establishes a top-level vision on climate change adaptation and guidance to departmental branches/units:

- Conduct education at top levels within the department on changing climate in NC to build case for the need to consider adaptation approaches.
- Establish a working group to monitor climate change activities at a national and state level, and to coordinate internally/externally to plan for risk management and adaptation.
- Consider conducting strategic vulnerability assessments.
- Develop lists of potential issues generated by climate change, including those related to engineering/design, the human environment, and natural environment.
- Consider conducting Risk Management Assessments.
- Set short-term, medium-range, and long-range planning and execution goals.
- Evaluate and monitor climate change activities and dynamics that affect project planning, functional and preliminary design, and permitting, including:

1. Monitor activities that require NEPA/SEPA or planning/permitting compliance, including:
 - CEQ protocols for climate change consideration that will likely require climate change consideration in documents, as well as greenhouse gas considerations
 - N.C. Legislative Commission on Climate Change
 - N.C. legislation
 - N.C. Department of Environment and Natural Resources - Division of Coastal Management's Sea Level Rise (SLR) regulatory initiative
 - CAMA land use plans
 - N.C. Department of Public Safety and Crime Control's Sea Level Rise Risk Management Study
 - N.C. Department of Environment and Natural Resources Climate Change Office
 - U.S. Department of Transportation and Federal Highway Administration guidance documentation
 - County and municipal land use ordinances
2. Monitor activities that will affect design of highway facilities (Hydraulics Unit), including:
 - Coastal Resources Commission's recommendations for N.C. sea level rise planning
 - U.S. Geological Survey's changes to rainfall intensity rates for design storms (possibly increasing by 15 percent)
 - Federal Emergency Management Agency's National Flood Frequency Program with regard to changes to storm surge elevations
 - N.C. Floodplain Mapping Program (FEMA) – changes to floodplains/floodways
 - Develop planning protocols for NEPA/SEPA studies (which rely on functional/preliminary design)
 - In coastal counties, consider sea level rise and changes in rain intensity, storm surge, floodplains and temperature; verify that destinations for highway projects are above water and inhabitable; monitor population shifts or declines; and consider local adaptation plans
 - In non-coastal counties, consider changes in storm frequency, rain intensity, floodplains and temperature; monitor population increases due to migration from coastal counties; and consider local adaptation plans.
 - Consider sea level rise and changes in the floodplain for Geotechnical Unit recommendations for highway grade
 - Consider sea level rise and changes in rain intensity, storm surge and floodplains during the development of Hydraulic Unit recommendations for specific projects, including bridge length, bridge scour, grade recommendations, pipe and culvert size and invert elevations, channel dimensions, structure recommendations, wave loading and highway armoring
 - Consider sea level rise, storm surge, floodplain and temperature changes during development of Structure Unit recommendations (wave loading).
 - Consider higher wind loads due to Category 4 and 5 hurricanes during development of signage recommendations
 - Consider changes in temperature during development of pavement recommendations
 - Consider the effects of sea level rise on proposed mitigation for wetlands and other habitat, as well as the potential for roads to act as potential barriers to wetland/habitat migration

Division of Highways – Preconstruction – Highway Design

Planning Program name: Highway Design (including Roadway and Hydraulics Design)

Purpose of Program: Design of highways within North Carolina

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it. The DOT currently utilizes USGS Regional Regression Equations for developing runoff hydrographs to estimate flow for bridges and culverts. The USGS has developed and published equations for every state. These equations are utilized by FEMA and N.C. Floodplain Mapping. These equations are periodically updated based on information from gage stations and would reflect changes in storm intensity and magnitude. Additionally, FEMA establishes 100-year storm surge elevations at the coast that DOT utilizes for scour calculation at bridges. What all this means is that as storm intensity and storm surge increase, this will automatically be reflected in the flow equations and storm surge elevation that DOT uses for bridge and scour design. As an added note, procedures developed by USGS for developing runoff hydrographs apply across the state. The regression equations for both rural and urban areas were developed for Blue Ridge Piedmont and the Coastal Plain region. As storm intensity and magnitude increase, this will automatically be reflected in storm volume calculations but it will not allow for future increases. Increases could be allowed for as they are already for urbanizing areas where future urbanization is predicted based on a percent increase.

In respect to sea level rise, designers could reconsider minimum grade calculations in coastal counties and consider salt water intrusion on subgrades and foundations, increased water table elevations, impacts to navigational clearances, longer bridges to span increasing breadth of water bodies, and the viability of resources that our infrastructure connects. In regard to increased intensity of rainfall events, NCDOT could consider the need for increased hydraulic openings/pipe sizes, the need for larger (more capacity) erosion control basins, increased ditch capacity, steeper roadway crown to remove water from roadways more quickly; prepare for more frequent overtopping of roadways; and investigate availability of alternate routes. For increased tropical storm intensities, planners and designers could evaluate evacuation routes/clearance times, prepare for increased maintenance/repair expenditures, and consider higher wind load values for sign/structure design. Options for addressing worsening drought situations include considering impacts to landscaping, impacts to soil settlement/consolidation characteristics, water conservation/storage/recycling at state facilities, and more dust control measures on soil roads and construction sites. With regard to worse heat waves, it may be necessary to consider adjusting working hours for field personnel, evaluate need for modified material placement specifications, and investigate impacts to asphalt pavement mix designs.

As an added note, NCDOT is just beginning to consider and grasp the impacts that accelerated climate change may bring to highway planning, design, construction and maintenance practices. Much of our response to this issue may very well be in reaction to changing regulations from other agencies such as FEMA, Division of Coastal Management, USACE, Coast Guard, etc. In areas that may be particularly vulnerable to climate change conditions (coastal areas, for example), it may be prudent to begin considering adaptations now for individual projects that would have considerable cost to the taxpayers and would be expected to have very long lifespans before reconstruction or replacement is an option.

Rail Division, Rail Environmental & Planning

Planning Program name: Rail Environmental & Planning

N.C. Legislative Authority for Program: General Statutes of North Carolina (NCGS) Section 136-66.1, Section 136-71.6, Section 160A-296 and 297, Section 136-18, Section 136-41.3 and Section 20-169

Federal Authority for Program: Title 23 of the Code of Federal Regulations, Part 633, Subpart A, and Part 635, Subpart A

Purpose of Program: Facilitate development of passenger and freight rail in North Carolina

Currently considers these climate impacts: Increased flooding and sea level rise, worse heat waves (mildly), and sea level rise

Considers adaptation strategies by: For new rail service in a coastal area, the design process would consider rail track elevations with regard to projections in sea level rise. In design, we consider the effects of increased flash flooding; this affects our hydraulic designs for structures and for drainage. In construction, continuous welded rail requires temperatures less than 92 degrees F. For installation, we must plan for decreased windows of time for construction in the hotter summers. In Operations, the increasing temperatures are making it necessary to install higher capacity air conditioning on the passenger cars; we are in the middle of a three year upgrade currently.

Recommendation for modification or expansion: None

Division of Aviation - Airport Development

Planning Program name: Airport Development

Purpose of Program: Airport Development provides engineering and technical assistance to local, state and federal governmental units, as well as private entities, on airport and aviation matters including planning, construction, maintenance and operations of airport facilities, airport economics and airport navigational aid facilities.

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it. There could be moderate impacts to airport facilities and services/operations, and standards for planning, design, construction and maintenance will need to evolve to adapt to the potential effects of climate change. On a federal level, FAA has been considering climate change for almost a decade, as it is one of the most serious long-term issues that the aviation industry faces. More study is needed in the area of airport pavement design to withstand higher temperatures, construction materials to withstand higher temperatures and winds, and types of landscaping to withstand droughts and heat, just to name a few. Facility elevations also need to take into account potential for increased flooding and runoff, as well possible sea level rise in coastal areas.

Division of Bicycle and Pedestrian Transportation – Transit (DBPT) -Bicycle and Pedestrian Long-Range Planning

Planning Program name: Bicycle and Pedestrian Long-Range Planning

Purpose of Program: Long-range planning of bicycle and pedestrian facilities

Currently considers these climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it. The division may investigate best practices for considering climate change in long-range planning for bicycle and pedestrian facilities, and potentially incorporate these practices in the long-range planning work of NCDOT's Bicycle and Pedestrian Division. DPBT administers a grant initiative to fund pedestrian and bicycle plans around the state, with 122 plans funded to date. The division could encourage cities and towns in North Carolina with which they are working, to consider climate change in the creation of their policies and plans. For example, in their zoning regulations a municipality may include a requirement for raised buildings and roadways and larger pipe conveyance, in order that the bicycle and pedestrian facilities constructed will be subject to lesser effects of climate change, particularly associated with sea level rise and flooding. In addition, requiring network connectivity in ordinances can assist in the diffusion of flooding along a corridor. Design guidelines for bicycle and pedestrian facilities could be

crafted to account for the events of climate change. Also, in working with municipalities around the state, the DPBT planning staff could inform city and town planners and engineers of the increased operations and maintenance costs that will accompany increased and more intense events resulting from climate change, and to budget accordingly in their planning and in their municipal budgets.

Division of Bicycle and Pedestrian Transportation – Transit Division (DBPT)- Specific Project Planning and Design

Planning Program name: Specific Project Planning and Design

Purpose of Program: The planning and design of bicycle and pedestrian projects

Currently considers climate impacts: No

Recommendation if program does not currently consider climate impacts: Could consider it. The division could investigate best practices for mitigation of and adaptation to climate change in the design of bicycle and pedestrian facilities and determine the feasibility of their implementation during the design process. Currently, there are no federal standards to require the consideration of climate change effects in project design planning. The DBPT could consider working with the Hydraulics Unit on designs that further consider potential flooding resulting from climate change, over and above the flooding events predicted in current flood plain mapping and analysis. Flooding along a pedestrian/bicycle facility, such as a multi-use path or sidewalk, will often result in degradation of the path and the accumulation of residue, which must be swept and maintained. DBPT may take further into consideration the effects of flooding and sea level rise in the siting, design and construction materials of bicycle and pedestrian facilities. Currently, DBPT opts in certain circumstances to use concrete for multi-use paths which experience flooding events. Also, in the working with various municipalities on bicycle and pedestrian facilities, the division engineers could inform city and town planners and engineers of the increased operations and maintenance costs that will accompany the increased frequency and severity of events resulting from climate change, and to budget accordingly in their planning and municipal budgets.

SL 2010-180:
Request for Agency Planning
and Regulatory Program
Information
Related to Climate Change

July 2011



North Carolina Department of Environment and Natural Resources

Beverly Eaves Perdue
Governor

July 15, 2011

Dee Freeman
Secretary

To: North Carolina Departments of Administration, Agriculture and Consumer Services, Commerce, Crime Control and Public Safety, Health and Human Services, Insurance, and Transportation

From: Dee Freeman 

Subject: SL 2010-180: Agency Planning and Regulatory Program Information Related to Climate Change

In 2010, a new law was passed (North Carolina Session Law 2010-180 / House Bill 1766), that requires state agencies to determine whether or not they are considering the impacts of global climate change in their regulatory and planning programs. As recommended by the Legislative Commission on Global Climate Change, SL 2010-180 is an important step in the integration of climate change consideration into the daily activities of state agencies. By considering what is already being done to address climate-related hazards, and how changed climate conditions might affect agency policies and responsibilities, each department can look for ways to incorporate these considerations into existing programs.

There is uncertainty about how much the climate will change in the future, but we know our coast is already showing signs of sea-level rise. In recent years, North Carolina has already experienced severe droughts and heat waves. The state has dealt with damaging hurricanes, and these storms are likely to be even more intense in the future. The people of North Carolina are at risk from increased hazards related to our changing climate.

Many of our planning and regulatory agencies use historical data to project future trends. However, if future circumstances do not match the historical climate trends, we will be ill-prepared for the resulting impacts. This survey provides an opportunity to think carefully about whether and how these programs might need to modify current protocols for decisions with long planning horizons.

SL 2010-180 focuses on climate change adaptation and sea-level rise, so that our state can reduce our vulnerability and build resiliency to these impacts. This law does not specifically address greenhouse gas reduction efforts by state agencies, or energy reduction. Under a separate reporting requirement, state agencies submit an annual Strategic Energy Plan to the State Energy Office to document reduction of energy and water consumption.

The attached document outlines the projected impacts of global climate variability and change, as well as recent extreme events, that North Carolina agencies should consider in this evaluation, and offers definitions of the terms used in the legislation. DENR has the responsibility to compile and report the information provided by the specified agencies to the Environmental Review Commission by Nov. 1, 2011. Therefore, please complete the surveys as instructed on the last page of this document by August 19, 2011.

Thank you in advance for your cooperation and response. DENR appreciates our continued working relationships on the issue of climate change preparedness.

Legislation

- WHY are we doing this?
- WHO must comply?
- WHEN is it due?

SL2010-0180 Planning and regulatory programs consider the impacts of global climate change

SECTION 13.(a) The Department of Administration, the Department of Agriculture and Consumer Services, the Department of Commerce, the Department of Crime Control and Public Safety, the Department of Environment and Natural Resources, the Department of Health and Human Services, the Department of Insurance, and the Department of Transportation shall:

(1) Review their respective planning and regulatory programs to determine whether the programs currently consider the impacts of global climate change, including adaptation and sea level rise.

(2) For those programs that currently consider the impacts of global climate change, the agency shall describe how the program considers the impacts of global climate change, including adaptation and sea level rise, and recommend whether the consideration of the impacts of global climate change should be modified or expanded.

(3) For those programs that do not currently consider the impacts of global climate change, the agency shall recommend if and how the program should consider the impacts of global climate change, including adaptation and sea level rise.

SECTION 13.(b) No later than September 1, 2011, each State agency shall report the results of its review and any recommendations to the Department of Environment and Natural Resources. The Department shall compile the results and recommendations and report them to the Environmental Review Commission and to any future legislative commission that directly and primarily addresses issues concerning global climate change no later than November 1, 2011.

Projected Impacts of Global Climate Variability and Change and Recent Extreme Events

What ***global climate change impacts*** should we consider? While uncertainty exists about how much the climate will change in the future, North Carolina's coast is already showing signs of sea-level rise. We have already experienced severe droughts, and heat waves. The state has dealt with damaging hurricanes, and these storms are likely to be even more intense in the future.

Recent Increases in Extreme Weather and Climate Events

In recent years, North Carolina has experienced an exceptional number of extreme weather and climate events. Since 2006, the state has set statewide records for the all-time warmest month (August 2007) and warmest summer (June-August 2010); has experienced its worst drought in more than 100 years (summer-winter 2007); and has been impacted by seven tropical cyclones.

Projected Increase in Natural Hazards Related to Climate in North Carolina

Rising sea level

- North Carolina is projected to be one of the top three states in the nation to be affected by sea-level rise, with more than half of the shoreline at very high risk.
- Sea levels in North Carolina could rise as much as 1.4 meters (55 inches) by the year 2100, according to the Coastal Resources Commission's Science Panel on Coastal Hazards. The state has thousands of square miles of land below this elevation that would be at risk of inundation. Much of the land in the state's northeastern coastal plain has very little slope, meaning that even small increases in sea level would result in a wide expanse of coastal land being inundated and lost.
- The value of property at risk in just four coastal counties is estimated at \$6.9 billion.
- Increased inlet breaching on barrier islands would result in hazards to beach communities, and increased salinity and flow in sounds that could negatively impact fish productivity.

Higher storm surges

- Since 2006, North Carolina has been impacted by seven tropical cyclones.
- Increased storm intensity is expected to produce higher storm surges along our coast. Combined with rising sea level, storm surge damage would reach farther inland and be more destructive.

Increased flooding

- Rainfall patterns throughout the state are likely to change, bringing less frequent, but more intense rains.
- Over a six-day period from Sept. 26-30, 2010, Wilmington recorded 22.54 inches from an extreme precipitation event, which set an all-time record for three, four and five-day rainfall totals extending back to 1871. The ensuing flooding resulted in a federal disaster declaration for New Hanover County.
- In each of the past five years, approximately half of all available weather stations in North Carolina recorded at least one extreme precipitation event with a one-day total in excess of three inches.

Tropical cyclone rainfall in the mountains

- More intense tropical cyclones (hurricane and tropical storms) can carry more rainfall further inland.
- Landslides can be triggered by rainfall of greater than five inches in 24 hours.
- A large number of landslides occurred in western NC in 1916, 1940, 1977 and 2005.

More droughts

- North Carolina experienced its worst drought in more than 100 years (summer-winter 2007).
- It is also likely that North Carolina will experience more droughts, which will add to existing water management challenges resulting from population growth in our state.

Worse heat waves

- Heat waves will likely become more frequent, longer-lasting and more intense.
- Meteorological summer 2010 (June-August) was the warmest on record (1895-2010) across the state of North Carolina, with the statewide mean summer temperature more than 2 degrees F higher than the previous warmest summer of 2007.
- For the year 2010, Raleigh-Durham recorded 91 days of 90 degree F temperatures or greater, breaking the previous record of 83 days set back in 2007. Charlotte recorded 87 days and Greensboro recorded 67 days of 90 degree temperatures and greater.

TERMINOLOGY

Adaptation: Management strategies for natural or human systems to cope with climate impacts. Proactive adaptation takes place before the impacts of climate change are observed, while reactive adaptation occurs afterwards.

Adaptive capacity: The ability of a natural or human system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

Consider: Think about carefully, take into account or weigh consequences of potential impacts.

Global climate change impact: Direct result of climate variability or change on natural and human systems; for example, sea-level rise, temperature increases, variability in precipitation, more severe storms, or increases in flooding, shoreline erosion, landslides and drought.

Planning program: A program whose purpose is to make or carry out plans, specifically including establishing goals, policies and procedures for the agency, other programs, the public or other government, social or economic units.

Regulatory program: A program whose purpose is to implement and administer particular legislation or rules.

Resiliency: A capability to anticipate, prepare for, respond to and recover from significant multi-hazard threats with minimum damage to social well-being, the economy and the environment.

Sea level rise: A long-term increase in the average surface height of the oceans.

Vulnerability: The degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes.

Examples of State Agency Planning and Regulatory Programs

The following chart provides examples of planning and regulatory programs and/or purposes of each of the agencies named in SL 2010-180(a).

Agency or Department	Planning Example	Regulatory Example
Administration	The State Property Office administers the acquisition and disposition of all state-owned land or any interest by deed, lease, easement or allocation; manages the state's submerged lands; and maintains an accurate inventory of state lands and buildings.	The State Environmental Review Clearinghouse manages the N.C. Intergovernmental Environmental Review process. Environmental assessment/impact analysis should provide decision makers with the information that would enable them to make an informed decision of the environmental consequences of their actions.
Agriculture and Consumer Services	The Agricultural Development and Farmland Preservation Trust Fund supports the farming, forestry and horticulture communities within the agriculture industry. The Trust Fund Advisory Committee makes recommendations on the prioritization and allocation of funds, the development of criteria for awarding funds, program planning and other areas for the growth and development of family farms in North Carolina.	The N.C. Department of Agriculture & Consumer Services enforces a number of laws and regulations, related to the agriculture industry, such as pest control, food production, aquaculture and food safety inspections.
Commerce	The Department of Commerce's Community Planning Program assists local governments with a mission of helping build communities for a better future through land use planning, facilitation and training services	The Public Staff reviews, investigates and makes recommendations to the N.C. Utilities Commission on the reasonableness of rates and adequacy of service provided by all public utilities in the state. The Public Staff also ensures policy consistency when verifying an energy supply is adequate to protect public health and safety.
Crime Control and Public Safety	The N.C. Floodplain Mapping Program is responsible for statewide development, maintenance and dissemination of digital flood insurance rate maps and relevant information.	The Division of Emergency Management develops and implements the state's Hazard Mitigation Plan, as required by the Disaster Mitigation Act of 2000. The plan contains a risk assessment that identifies and assesses the state's vulnerability to all natural hazards.

Agency or Department	Planning Example	Regulatory Example
Environment and Natural Resources	The Division of Coastal Management oversees the Coastal Area Management Act, requiring 20 coastal counties to have a local land use plan in accordance with guidelines established by the Coastal Resources Commission.	The National Pollutant Discharge Elimination System (NPDES) program was established by the federal government to control point-source discharges of wastewater. The N.C. Division of Water Quality is responsible for administering North Carolina's NPDES Permitting and Compliance Program.
Health and Human Services	The Office of Citizen Services (OCS) leads the N.C. Department of Health and Human Services (NCDHHS) in coordinating emergency services during times of disaster.	The Division of Health Service Regulation oversees medical, mental health and adult care facilities, emergency medical services, and local jails. DHS checks to see that people receiving care in these facilities are safe and receive appropriate care.
Insurance	The Commissioner of Insurance is charged with the administration and development of the N.C. State Building Code.	The Commissioner and Department of Insurance regulate the various kinds of Insurance sold in North Carolina and the companies and agents who sell it. This includes regulating the language in insurance policies and risk classification.
Transportation	NCDOT developed a long-range plan that prioritizes transportation investments for the next 25 years. The Statewide Transportation Plan provides a blueprint for greater investments in maintenance, preservation and modernization of the state's existing highway system as well as other transportation options such as rail, and public transportation.	The Division of Motor Vehicles promotes highway safety, enforces motor vehicle laws and maintains the integrity of official DMV records.

Instructions for Survey for Session Law 2010-180: Agency Planning and Regulatory Program Information Related to Climate Change

SL 2010-180(b) requires that the named agencies review their regulatory and planning programs in order to:

1. Determine if they currently consider impacts of global climate change in North Carolina;
2. If programs do consider it, should that be modified or expanded; and
3. If programs do not currently consider it, what should be added.

Applies to:

- the Department of Administration,
- the Department of Agriculture and Consumer Services,
- the Department of Commerce,
- the Department of Crime Control and Public Safety,
- the Department of Environment and Natural Resources,
- the Department of Health and Human Services,
- the Department of Insurance, and
- the Department of Transportation

PLEASE NOTE:

1. Planning and regulatory programs include planning programs, regulatory programs and programs with both planning and regulatory purposes.
2. SL 2010-180 focuses on climate change adaptation to specific climate impacts, including sea-level rise. This law does not specifically address greenhouse gas reduction efforts by state agencies, or energy reduction. Under a separate reporting requirement, state agencies submit an annual Strategic Energy Plan to the State Energy Office to document reduction of energy and water consumption.

Completion and submission of this form will satisfy the requirements of North Carolina Session Law 2010-180 (House Bill 1766).

1. Please complete the survey for each planning and/or regulatory program within the agency. Complete a separate survey for each program. The survey form is available online at <https://www.surveymonkey.com/s/BSHZTH8>.
2. An instructional presentation is provided at <http://portal.ncdenr.org/web/climate/sl-2010-180>.
3. Refer to the preceding reference materials for supporting information on climate impacts and terminology.
4. Think carefully about how each program currently factors historical climate trends or natural hazards into decisions. How might that change if future climate conditions are more severe?
5. Submit all survey responses no later than **August 19, 2011**.

Questions? Contact:

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1. Provide specific information about this program.

***1. Agency/Department:**

***2. Division:**

3. Section/Management Unit:

4. Planning Program name:

5. Regulatory Program name:

***6. Contact Person and Phone Number:**

7. N.C. Legislative Authority for Program (statute, rule, etc.):

8. Federal Authority for Program (rules, guidelines, etc.):

***9. Purpose of Program:**

2. Does program consider climate Impacts?

***1. Have you reviewed this planning or regulatory program to determine whether the program currently considers the impacts of global climate change, (e.g. sea level rise, more severe storms, or increases in temperature, flooding, shoreline erosion, and drought)?**

☐ Yes

☐ No

***2. Does the above-named program currently consider the impacts of global climate change?**

☐ Yes

☐ No

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3. Climate Impacts

1. Which climate impacts are considered? (multiple answers accepted)

- | | |
|--|---|
| <input type="checkbox"/> rising sea level | <input type="checkbox"/> increased droughts |
| <input type="checkbox"/> higher storm surge | <input type="checkbox"/> worse heat waves |
| <input type="checkbox"/> increased flooding | <input type="checkbox"/> other impact _____ |
| <input type="checkbox"/> tropical cyclone rainfall | |

4. Vulnerability

1. In regards to the resource that is managed through this planning/regulatory program, how vulnerable is it to the impacts of climate change?

- ☐ Highly
- ☐ Moderately
- ☐ Mildly
- ☐ Not vulnerable

5. Sea-level rise

1. If the program considers sea-level rise, how much and in what way?

6. Other impacts

1. If you indicated "other impact," please specify.

7. Adaptation

1. Does this program consider adaptation strategies to cope with these climate impacts?

- ☐ Yes
- ☐ No

8.

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1. If YES, in what way does it consider adaptation strategies?

2. If YES, how developed are these strategies?

- ☐ Well developed
- ☐ Moderately developed
- ☐ Under developed

9. Modification or expansion

1. Would you recommend that the consideration of the impacts of global climate change in this program be modified or expanded?

- ☐ Yes
- ☐ No

2. If YES, in what way?

3. If NO, why not?

10. Work group of other forum

1. Does your Division/Section/Management Unit have an existing work group or other forum (e.g. SEPA/NEPA review process) to facilitate addressing global climate change for this planning/regulatory program area?

- ☐ Yes
- ☐ No

11. Program does NOT currently consider climate change

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1. If this program does NOT currently consider the impacts of global climate change, would you recommend that it SHOULD consider it?

☐ Yes

☐ No

2. If YES, in what way?

12. Additional comments

1. Additional comments you would like to make: